PRACTICAL NO. 3 Remote Object Communication

a) Using MySQL create Library database. Create table Book (Book_id, Book_name, Book_author) and retrieve the Book information from Library database using Remote Object Communication concept.

Code:

LibraryInterface.java

```
package libDB;
import java.rmi.Remote;
import java.rmi.RemoteException;
import java.util.List;
public interface LibraryInterface extends Remote {
	List<String> getAllBooks() throws RemoteException;
	String getBookById(int id) throws RemoteException;
}
```

LibraryImpl.java

```
package libDB;
import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;
import java.sql.Connection;
import java.sql.Driver;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.util.ArrayList;
import java.util.List;
import java.sql.Statement;
public class LibraryImpl extends UnicastRemoteObject implements LibraryInterface {

	Connection conn;

	protected LibraryImpl() throws RemoteException
	{
		super();
		try {
			//connect to mysql
			conn = DriverManager.getConnection("jdbc:mysql://localhost:3306/prac3","root","");

		} catch (SQLException e) {
			e.printStackTrace();
		}
	}
	@Override
	public List<String> getAllBooks() throws RemoteException{
		List<String> books = new ArrayList<String>();
```

```
		try {
			Statement stmt= conn.createStatement();
			ResultSet rs = stmt.executeQuery("SELECT * FROM Book");
			while(rs.next())
			{
				books.add(rs.getInt(1)+" - "+rs.getString(2)+" by "+rs.getString(3));
			}
		} catch (SQLException e) {
			e.printStackTrace();
		}
		return books;

	}
	@Override
	public String getBookById(int id) throws RemoteException{
		try {
			PreparedStatement ps= conn.prepareStatement("SELECT * FROM Book WHERE
Book_id = ?");
			ps.setInt(1, id);
			ResultSet rs = ps.executeQuery();
			if (rs.next()) {
				return rs.getInt(1) + " - "+ rs.getString(2)+" by" + rs.getString(3);
			}
		} catch (SQLException e) {
			// TODO: handle exception
			e.printStackTrace();
		}
		return "Book not found";
	}

}
```

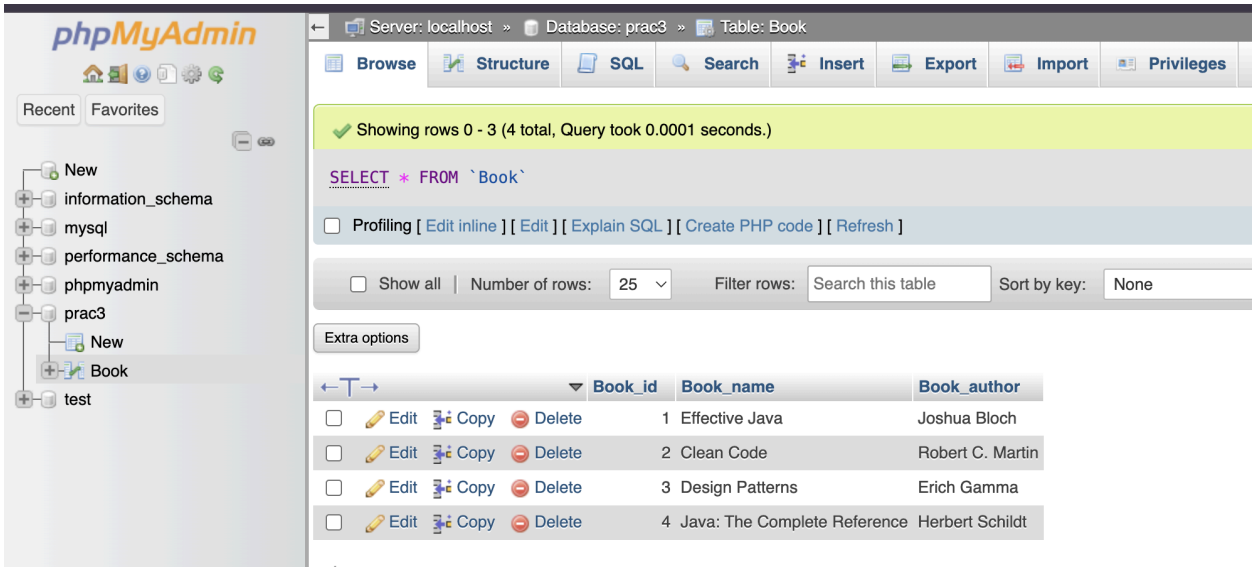
LibraryServer.java

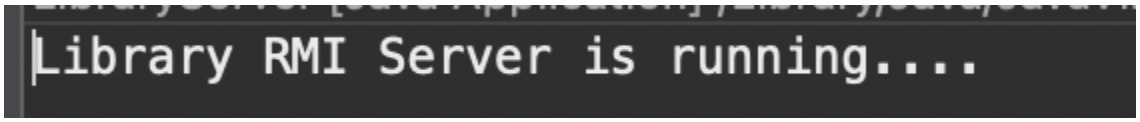
```
package libDB;
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
public class LibraryServer {
	public static void main(String[] args) {
		try {
			LibraryImpl obj = new LibraryImpl();
			Registry reg = LocateRegistry.createRegistry(1090);
			reg.rebind("LibraryService", obj);
			System.out.println("Library RMI Server is running....");
		} catch (Exception e) {
			e.printStackTrace();
		}
	}
}
```

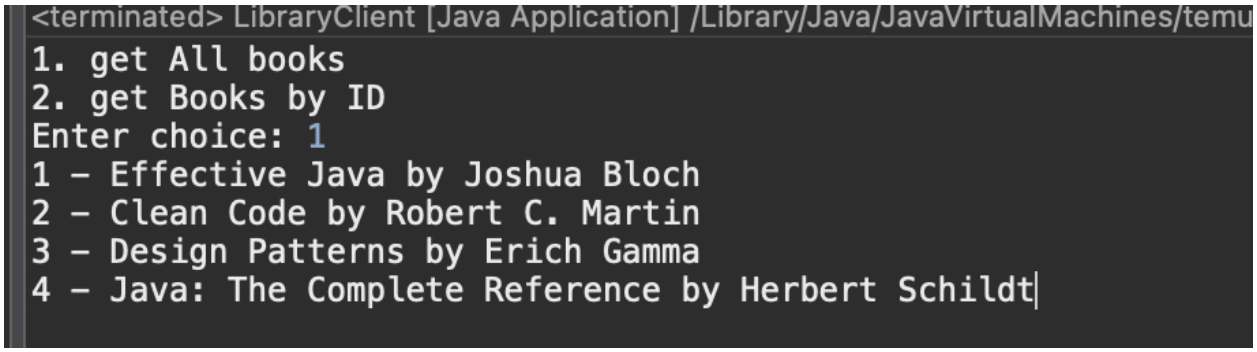
LibraryClient.java

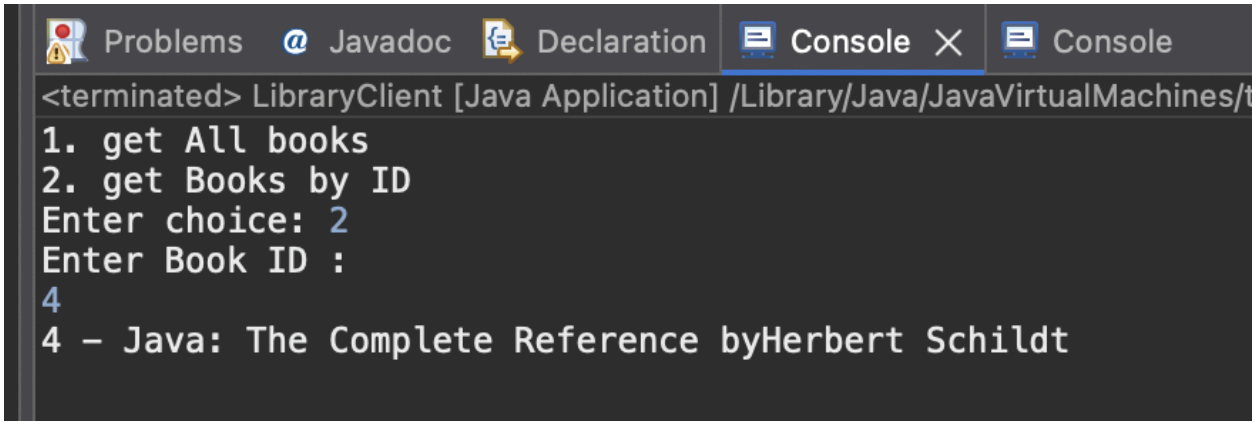
```
package libDB;
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
import java.util.Iterator;
import java.util.List;
import java.util.Scanner;
public class LibraryClient {
	public static void main(String[] args) {
		try {
			Registry reg = LocateRegistry.getRegistry("localhost",1090);
			LibraryInterface lib= (LibraryInterface) reg.lookup("LibraryService");

			Scanner sc= new Scanner(System.in);
			System.out.println("1. get All books ");
			System.out.println("2. get Books by ID ");
			System.out.print("Enter choice: ");
			int choice = sc.nextInt();

			if (choice == 1) {
				List<String> books = lib.getAllBooks();
				for(String b : books)
				{
					System.out.println(b);
				}

			}
			else if (choice ==2) {
				System.out.println("Enter Book ID : ");
				int id = sc.nextInt();
				System.out.println(lib.getBookById(id));
			}

		} catch (Exception e) {
			e.printStackTrace();
		}
	}
}
```

Output









b) Using MySQL create Electric_Bill database. Create table Bill (consumer_name, bill_due_date, bill_amount) and retrieve the bill information from the Electric_Bill database using Remote Object Communication concept.

Code:
BillService.java

```
package BillDB;
import java.rmi.Remote;
import java.rmi.RemoteException;
import java.util.List;
public interface BillService extends Remote {
  List<String> getBillInfo() throws RemoteException;
}
```

BillServiceImpl.java

```
package BillDB;
import java.rmi.server.UnicastRemoteObject;
import java.rmi.RemoteException;
import java.sql.*;
import java.util.ArrayList;
import java.util.List;
public class BillServiceImpl extends UnicastRemoteObject implements BillService {
  protected BillServiceImpl() throws RemoteException {
    super();
  }
  @Override
  public List<String> getBillInfo() throws RemoteException {
    List<String> bills = new ArrayList<>();
    try {
      Class.forName("com.mysql.cj.jdbc.Driver");
      Connection con = DriverManager.getConnection(
          "jdbc:mysql://localhost:3306/Electric_Bill", "root", "password");
      Statement stmt = con.createStatement();
      ResultSet rs = stmt.executeQuery("SELECT * FROM Bill");
      while (rs.next()) {
        String row = "Consumer: " + rs.getString("consumer_name") +
            ", Due Date: " + rs.getDate("bill_due_date") +
            ", Amount: " + rs.getBigDecimal("bill_amount");
        bills.add(row);
      }
      con.close();
    } catch (Exception e) {
      e.printStackTrace();
    }
    return bills;
  }
}
```

BillServer.java

```
package BillDB;
```

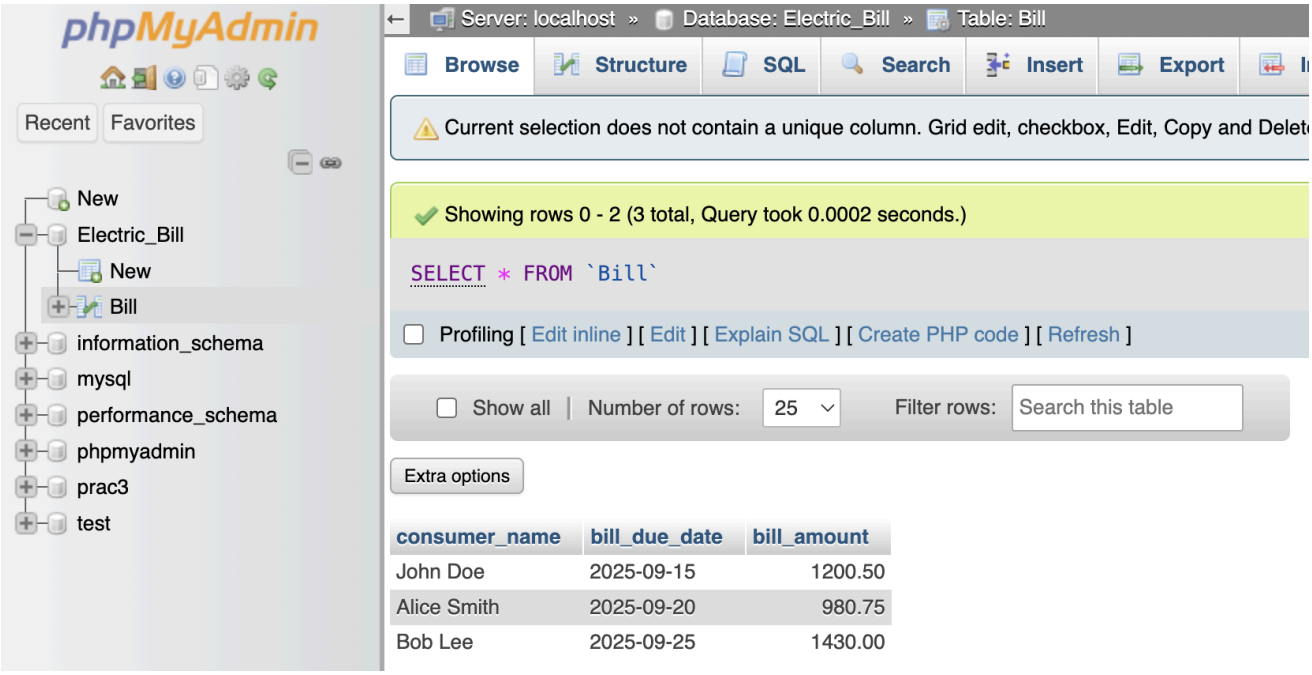
```
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
public class BillServer {
  public static void main(String[] args) {
    try {
      BillServiceImpl obj = new BillServiceImpl();
      Registry reg = LocateRegistry.createRegistry(1099);
      reg.rebind("BillService", obj);
      System.out.println("Bill RMI Server is running...");
    } catch (Exception e) {
      e.printStackTrace();
    }
  }
}
```

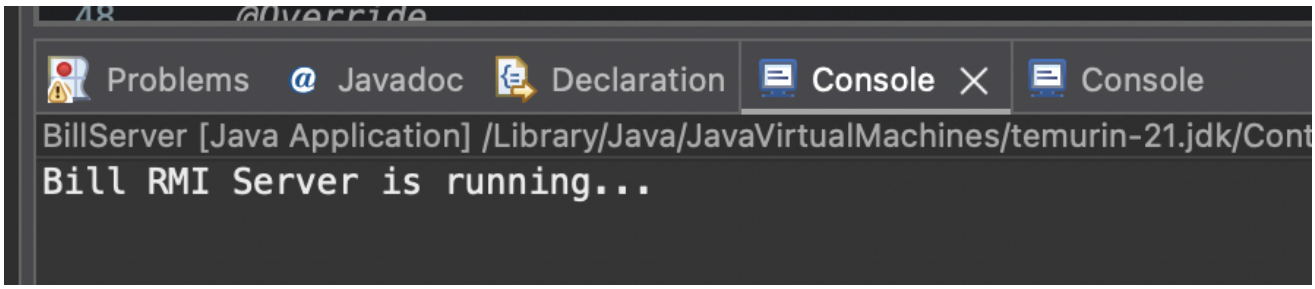
BillClient.java

```
package BillDB;
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
import java.util.List;
import java.util.Scanner;
public class BillClient {
  public static void main(String[] args) {
    try {
      // Connect to RMI registry
      Registry reg = LocateRegistry.getRegistry("localhost", 1099);
      BillService billService = (BillService) reg.lookup("BillService");
      Scanner sc = new Scanner(System.in);
      int choice;
      do {
        System.out.println("\n===== Electric Bill Menu =====");
        System.out.println("1. Get All Bills");
        System.out.println("2. Get Bill by Consumer Name");
        System.out.print("Enter your choice: ");
        choice = sc.nextInt();
        sc.nextLine(); // consume newline
        switch (choice) {
          case 1:
            List<String> bills = billService.getAllBills();
            if (bills.isEmpty()) {
              System.out.println("No bills found!");
            } else {
              System.out.println("\n--- Bill Details ---");
              for (String b : bills) {
                System.out.println(b);
              }
            }
            break;
          case 2:
```

```
                System.out.print("Enter Consumer Name: ");
                String name = sc.nextLine();
                String result = billService.getBillByConsumer(name);
                System.out.println("\n" + result);
                break;
            default:
                System.out.println("Invalid choice. Try again!");
        }
      } while (choice != 3);
      sc.close();
    } catch (Exception e) {
      e.printStackTrace();
    }
  }
}
```

Output:





```
===== Electric Bill Menu =====
1. Get All Bills
2. Get Bill by Consumer Name
Enter your choice: 1

--- Bill Details ---
John Doe | Due: 2025-09-15 | Amount: 1200.50
Alice Smith | Due: 2025-09-20 | Amount: 980.75
Bob Lee | Due: 2025-09-25 | Amount: 1430.00
```

```
===== Electric Bill Menu =====
1. Get All Bills
2. Get Bill by Consumer Name
Enter your choice: 2
Enter Consumer Name: john doe

John Doe | Due: 2025-09-15 | Amount: 1200.50
```

Conclusion:
This practical helped us understand and implement Java Remote Method Invocation (RMI) to communicate between client and server applications.We successfully created databases (Library and Electric_Bill), connected them using **JDBC**, and retrieved records remotely. This demonstrates how distributed applications can share data securely and efficiently across different machines.